Claims 23, 24, 28-31, 35, 39 and 41, were objected to by the examiner because of certain informalities, which the Examiner enumerated in the present Office Action. It is respectfully submitted that some of these objections reflect grammatical issues, and were written in proper idiomatic English. However, in the response, all of these issues have been addressed in a manner which is believed to overcome the Examiner's objections. Please note that with regard to the Examiner's objection to claim 31, it is believed that the Examiner was actually referring to claim 32, which has been amended in response. It is therefore believed that all of the claims have been amended to overcome the Examiner's objections.

Additionally, the Examiner rejected claims 23-44 under 35 USC §112, second paragraph. The Examiner made specific rejections against claims 23, 24, 26, 28, 31, 32, 42 and 43. In response thereto, these claims have been amended to correct the deficiencies noted by the Examiner. With regard to claim 24, the outer ends referred to are not the same as the end or front faces elsewhere referenced. The ends of claim 24 are used to hold the optical conductors inside the measuring head, and not for launching light into or out of the optical conductors. It is believed that all of the claims now fully comply with the requirements of 35 USC §112, second paragraph.

The Examiner rejected claims 23-29, 31-37, 39-41 and 43 under 35 USC §103 as being unpatentable over Pederson et al. (U.S. Patent No. 5,319,975.) Claims 30, 38, 42 and 44 were rejected under 35 USC §103 as being unpatentable over Pederson et al. in view of Wagner (U.S. Patent No. 5,001,054 and Bessman et al. (U.S. Patent No. 4,431,004).

The Examiner noted on page 9 of the outstanding Office Action, his response to the arguments of February 18, 2002. The Examiner notes that the limitation referred to by applicant in applicant's arguments was optional, as it was written in and/or language. It is respectfully submitted that in the present response, these limitations have been rewritten with the optional language removed, therefore the earlier arguments, with regard to the arrangement as a function of the numerical apertures, are believed to now be persuasive.

Before discussing the prior art in detail, the Examiner's attention is directed to the present invention, as claimed in independent claim 23. The present invention is directed towards a device for measuring fluorescence excited by light. The device has at least one layer applied to a support, the layer containing a fluorescing material. At least one light source emits light of at least one wavelength that excites fluorescence(s) in the at least one layer, and which light is directed through the support onto the at least one layer by at least one first optical conductor. The end faces of all the optical conductors are arranged relative to one another as a function of their numerical apertures and/or as a function of the at least one layer containing a fluorescing material.

Pederson et al. discloses a fiber optic moisture sensor, comprising a housing and a support within the housing, with a film coating the support. First and second light guides are positioned to communicate illumination to and from the film. A reflective surface, within the housing, faces the film. The film includes an optically transparent polymer and a salt complex of a metal ion and an organic compound. The salt is capable of absorbing moisture and emits a fluorescent signal when excited by light at the appropriate wavelength. The light is quenched as the coating complex absorbs moisture.

Wagner discloses a method for monitoring the glucose level in a body fluid. The method of Wagner utilizes an apparatus including a conjugate of glucose oxidase and a fluorescent dye coated onto an optical fiber. An excitation light source is used to trigger fluorescence emission which is registered by a fluorescence emission detector. The fluorescent dye detects oxygen quenching, as fluorescence emission increases in direct proportion to the glucose concentration in the fluid.

Bessman discloses a method and apparatus for detection of glucose in the body. The apparatus detects the absolute level of oxygen concentration in the fluid and corrects the output differential measurement indicative of the glucose level according to the absolute level of oxygen.

The independent claim (23) was rejected under Pedersen alone. It is important to note that the present invention requires that light be directed onto the at least one layer through the support. The layer, disposed on the support, contains the fluorescing material. The light directed at this layer, through an optical conductor, excites fluorescence in the layer. This excited fluorescent light is directed through the second optical conductor(s).

As amended, claim 23 notes that the end faces of the optical conductors are arranged with reference to position of the at least one layer. The arrangement of these layers allows an optimal intensity of fluorescence exciting light. The intensity used can thus be small enough to reduce the "aging" of the fluorescing material, thus extending its life. A very high intensity should be avoided.

Nothing in Pedersen utilizes or suggests arranging the end faces of the optical conductors with reference to position of the at least one layer, as is done in claim 23. The present invention utilizes this arrangement of the end faces to achieve a quick response, high measuring accuracy and defined overlapping of the numerical apertures.

This factor is important in that it is not possible to distribute the fluorescent material inside the polymer matrix in a perfectly homogeneous manner in the coating. Additionally, known fluorescent materials tend to decrease in effectiveness when exposed to light over time. The aging of these materials decreases their effectiveness, and interferes with their use as detectors. Typically, the fluorescence intensity will decrease after exposed to illumination for several hours. By directing the light through the optical conductor to the detector, it increases the sensitivity and thus allows for correction of errors caused by the above factors.

It is respectfully submitted that it is not obvious to one skilled in the art to arrange different optical conductors in the specified manner inside the measuring head in conjunction with light sources and detectors. It is submitted that one skilled in the art would not, in view of Pederson, come to the invention disclosed in claim 23 of the present invention.

It should additionally be noted that the system of Bessman does not use an optical system, instead utilizing electrical electrodes. Therefore, it is submitted that the Bessman reference is not relevant to the present invention.

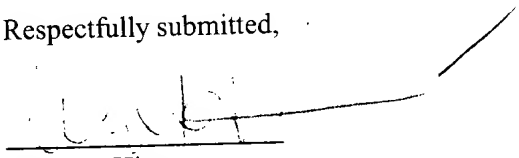
The Pedersen reference alone was applied against the independent claim, and as discussed above, it is submitted that this does not anticipate, nor render obvious, the present invention as claimed. However, even in conjunction with the remaining references, it is respectfully submitted that the present invention is not rendered obvious.

It is therefore submitted that the prior art references do not anticipate, nor render obvious, the present invention, utilizing paired optical conductors positioned as a function of the numerical apertures of the end faces of the optical conductors, to achieve a localized assignment of the measurable fluorescence intensity.

Claims 24-44, which depend directly or indirectly from an allowable claim 23, are believed to be allowable based, at least, upon this dependence.

Should the Examiner wish to modify the application in any way, applicant's attorney suggests a telephone interview in order to expedite the prosecution of the application.

Respectfully submitted,



Mark A. Hixon
Registration No. 44,766

ATTORNEYS
Marshall & Melhorn
Four SeaGate - 8th Floor
Toledo, Ohio 43604
(419) 249-7114

VERSION WITH MARKINGS TO SHOW CHANGES MADE

23. (twice amended) Device for measuring fluorescence excited by light, which has at least one layer which is applied to a support and which at least one layer contains a fluorescing material, having at least one light source which emits light of at least one wavelength that excites fluorescence(s) and thus fluorescent light in the at least one layer, and which [is] light is directed through the support onto the at least one layer by at least one first optical conductor, the fluorescent light being directed by at least one second optical conductor onto at least one detector for determining the intensity of the fluorescent light, wherein the end faces of all the optical conductors are arranged relative to one another as a function of their numerical apertures and[/or] with reference to the position of the at least one layer containing a fluorescing material [and which layer is applied to the support], and the at least one second optical [conductors] conductor which are arranged as a bundle in the shape of a ring are arranged with the at least one optical conductor, arranged in the interior of the ring, which bundle is used for exciting light or for generating [fluorescent] fluorescence light, or the at least one first optical conductor comprises a plurality of first optical conductors and the at least one second optical conductor comprising a plurality of second optical conductors, and a plurality of the [at least one] first optical conductors are arranged in series arrangements opposite one another, with ones of the first optical conductors and [a] corresponding [one] ones of the second optical conductors forming pairs, such that it is possible to achieve a defined localized distribution of measurable fluorescence intensity, and the light source(s), the [at least one] first and [the at least one] second conductors and the detector(s) are held in a measuring head.

24. (twice amended) Device according to claim 23, wherein a part of the measuring head holds [the] outer ends of the optical conductors, and at least the part of the measuring head which holds the outer ends of the optical conductors is of flexible construction.

26. (twice amended) Device according to claim 23, wherein at least one of a filter, a system of exchangeable filters [and/] or a launching optical system is [/are] arranged in each case between the light source and at least one first optical conductor [and/or between the detector and the at least one optical conductor].

27. (twice amended) Device according to claim 23, wherein the [at least one second] optical conductors are arranged in the shape of a ring, a circular arc [and/] or a star on an end of the measuring head pointing towards the at least one layer containing fluorescing material.

28. (twice amended) Device according to claim 23, wherein the at least one second optical [conductors] conductor for [the] exciting light, [and the] reference light or further fluorescent light are arranged in an alternating fashion in an outer ring, and at least one of the second optical conductors for fluorescent light are arranged in an inner ring.

29. (twice amended) Device according to claim 23, wherein the at least one first and the at least one second optical conductors [for exciting light, fluorescent light and reference light or a further fluorescent light] are inclined at different angles with their ends pointing towards the fluorescing layer.

30. (twice amended) Device according to claim 23, wherein there is arranged on [the] an upper measuring head region a heater having a temperature sensor and a controller or regulator which is arranged in the measuring head and maintains a prescribable temperature at the fluorescing layer(s) [and/ or at an upper region of the measuring head].

31. (twice amended) Device according to claim 23, wherein the support, which is transparent to exciting light and fluorescent light has [at least] partially polished or reflecting surface regions [and/]or the surface is surrounded [there] by a medium of lower refractive index, and is mounted in an exchangeable fashion on the measuring head.

32. (twice amended) Device according claim 31, wherein [the] exciting light is launched into the support with the aid of at least one optical conductor such that the exciting light is totally reflected at least in the region of the layer, and [damped] total reflection occurs.

35. (twice amended) Device according to claim 31, wherein, on an end face opposite an end face into which the exciting light can be launched, the support has an angular surface and a layer of the at least one layer which contains fluorescing material and at which the exciting and fluorescing light is reflected in the direction of a planar optical conductor constructed symmetrically relative to the support, and the light from the angular surface thereof is directed onto an end face arranged at the other end of [the] an optical conductor, and from there at least fluorescent light is directed onto a detector via at least one optical conductor, the support and planar optical conductor being arranged at a spacing from one another [and/] or being optically separated as far as into the region of the angular [surface s] surface.

36. (twice amended) Device according to claim 31, wherein the support is of u-shaped construction comprising two limbs, the two limbs [are arranged at least partially spaced apart

and/or] are optically separated from one another, and the exciting light can be launched into an end face of a limb via at least one additional optical conductor, and at least fluorescent light can be coupled out via the end face of the other limb into at least one further optical conductor.

38. (twice amended) Device according to claim 23, wherein heating elements [and/or temperature sensors] are integrated into the support.

39. (twice amended) Device according to claim 23, wherein between one of the optical conductors for fluorescence-exciting light and one of the at least one layers containing the fluorescing material, a transparent body made from optically scattering material is arranged or a [body is positioned the] body comprising a diffusely scattering surface is positioned facing the layer [which surface is constructed or arranged on the body].

40. (twice amended) Device according to claim 39, wherein the body is formed from optically transparent material which contains light-scattering particles [and/or is wavelength-selective].

41. (twice amended) Device according to claim 23, wherein at least one further optical conductor directs reference light onto a further detector for detecting a reference signal.

44. (amended) Device according to 23, wherein the support is configured to receive heating elements [and/or temperature sensors].